

REMARKS

The last Office Action has been carefully considered.

It is noted that claims 1, 2, 4, 5, 7-15 and 17-20 are rejected under 35 U.S.C. 103(a) over the patent to Bijawat in view of the patent to Biermann.

Claim 3 is rejected under 35 U.S.C. 103(a) over the patent to Bijawat and Biermann in view of the U.S. patent application Sport.

Claim 1 is objected to because of informalities which are contained in this claim in the Examiner's opinion.

Claims 6 and 16 are not rejected by the Examiner over the prior art and both indicated as generally allowable.

The Examiner's indication of the allowability of claims 6 and 16 has been gratefully acknowledged. In connection with this indication claims 6 and 16 have been rewritten in independent form including all of the limitations of the intervening claims. It is believed that claims 6 and 16 are now in allowable condition.

In connection with the Examiner's objection to claim 1, applicant wishes to make the following remarks.

Claim 1 defines the measurement of an impedance, or in other words the measurement of a complex (in mathematical sense "complex") resistance. Such a complex resistance has a real part and an imaginary part. The real part of the complex resistance corresponds substantially to the value (in mathematical sense) of the resistance. The imaginary part of the complex resistance corresponds substantially to the phase of the resistance.

Claim 1 has been formulated in accordance with this concept, and also in compliance with the Examiner's proposal to define that both the value and the phase of such a resistance are measured. The expression "a value and a phase of a resistance" is provided to clarify the term "impedance".

The original use term "impedance" is unambiguous. When it is stated in the claims that an impedance is measured, it is unambiguously clear that both the value and phase of resistance is measured. In order to further clarify the issue, claim 1 has been amended to define that a value and a phase of a complex resistance are measured. The Examiner is respectfully requested to review the proposed change and to advise

whether it is sufficient to eliminate the Examiner's grounds for the objection to claim 1. It is believed that claim 1 should be considered as clearly defining the claimed subject matter.

Turning now to the Examiner's rejection of the claims over the art, and in particular as being obvious over a combination of the patents to Bijawat and Biermann, applicants wish to make the following remarks.

In his rejection of the claims the Examiner did not consider the patent to Bijawat as completely disclosing the subject matter of the present invention, but instead combined it with the patent to Biermann and stated that a combination would lead to the applicant's invention. Applicants have to respectfully disagree with this position for the following reasons.

The patent to Bijawat does not disclose any impedance measurement. The part of the patent cited by the Examiner, in particular column 7, lines 20-30, discloses that the apparatus of the patent to Bijawat uses a capacitive sensor. This part of the patent however does not disclose that the apparatus carries out an impedance measurement.

The Examiner's statement that a capacitive sensor is identical to the impedance measurement as defined in claim 1, is not understood. The capacitive sensor can not and does not provide impedance measurements. Thus, this feature of the present invention is clearly not disclosed in the patent to Bijawat.

It also can not be considered as obvious from the patent to Bijawat to use for evaluation of the detection signal an algorithm which carries out a separation of the measured signal into signal parts originating from the enclosing medium and signal parts originating from the object enclosed in the medium as defined in claim 1.

Claim 1 specifically defines the following features:

- A. The measurement of a detection signal,
- B. the use of an algorithm for evaluation of the detection signal,
- C. the separation by the algorithm of the measured detection signal into signal parts originating from the enclosing medium and signal parts originating from the object enclosed in the medium.

Each measuring signal is thereby separated by the algorithm into its parts, resulting on the one hand from the background signal (a signal which is produced when the enclosed object is not available) and the signal resulting from the enclosed object (this signal has nothing to do with the background). This is carried out for each measuring point regardless of whether an enclosed object is available or not.

The algorithm carries out for each individual measuring point a separation into the signal parts. This is the basic idea underlying the present invention, and it is defined in claim 1.

The patent to Bijawat does not disclose a method in which an algorithm is used for separation of the measured signal into the signal parts of background and of enclosed object.

The arguments presented by the Examiner on page 3 of the Office Action can not be considered as justifiable, since they provide an interpretation of the patent to Bijawat which this reference does not teach. This interpretation can be only equated with unpermissible hindsight. A person skilled in the art who familiarize himself with the method disclosed in the present application would have no hint or suggestion from the patent to Bijawat to provide an evaluation of the detection signal with the use of an algorithm which carries out a separation in the measured signal

into signal parts originating from the enclosing medium and the signal parts originating from the object enclosed in the medium.

What the patent to Bijawat actually discloses is the apparatus in which it can be distinguished whether an object is detected or not. For his purpose typically a threshold value is used, so that when the threshold value is exceeded the measuring device signals that an object is detected. For determination of the threshold value, for example, a background measurement can be performed. This however does not mean that the measured detection signal is separated into signal parts originating from the enclosing medium and signal parts originating from the object enclosed in the medium. In the apparatus of the patent to Bijawat it is determined whether such a threshold is exceeded or not. A signal subdivision or separation is however not carried out. The apparatus disclosed in the patent to Bijawat can not distinguish which part of the measured signal originates from the object and which part originates from the background. For detecting an enclosed object it is evaluated whether a typical threshold value is exceeded. When this is the case, then, for example via an LED indicator, a user obtains a signal that an enclosed object is detected. The information as to how high is the signal part which originates from the enclosed object is not available in the method disclosed in the patent to Bijawat.

In the part of the patent to Bijawat cited by the Examiner, in particular in column 4, lines 29-52, it is disclosed that with the calibration routine a sensitivity adjustment can be carried out. In the patent to Bijawat it is specifically stated in column 4, line 45:

"Sensor 10 is placed over a location where metal object is known to exist, and the unit is turned on. When green LED 30 starts to flash, sensor 10 will be set. Metal circuit 46 will set its sensitivity to the necessary depth. It will then only indicate whether a metal object exists at the set depth or closer."

The Examiner is respectfully requested to clearly indicate where in the patent to Bijawat it is disclosed that for evaluation of the detection signal a separation into the corresponding signal parts is carried out. The patent to Bijawat does not disclose this feature at all, and it can not be derived from it.

The difference between the detection method as defined in claim 1 when compared with the method disclosed in the patent to Bijawat is especially pronounced during the measurements of an object enclosed in the medium: When an enclosed object is measured or in other words detected, then in a method in accordance with the present invention the detected measuring signal is separated into parts originating from the background and the parts originating directly from the enclosed object. The apparatus disclosed in the patent to Bijawat or a method which is used with the apparatus measures however only the integral signal, or in

other words a signal which contains both the parts of the objects and the parts of the background. The Bijawat measures whether an accurately measured signal is located above or below a threshold, which for example corresponds to the background signal. The separation into signal parts is not carried out. It is respectfully submitted that on page 3 in the last sentence of the first paragraph the Examiner specifically stated the following:

Bijawat, et al fails to disclose measuring impedance so that the value of the phase of a resistance are measured.

It is therefore believed that the Examiner generally agrees with the applicant's opinion on this particular issue, about the novelty of this feature in the method in accordance with the present invention.

It is believed to be clear that the patent to Bijawat does not disclose any impedance measurement at all.

The patent to Biemann discloses a method for measuring a distance between a sensor electrode 12 and a workpiece 15, in which the sensor electrode 12 forms a measuring capacitor with the workpiece 15, through which an alternating current flows. A voltage applied to the sensor electrode 12 is picked up as a measuring voltage. For eliminating the disturbing influence of plasma formed between the sensor electrode

and the workpiece on the impedance of the measuring capacitor, from the measuring voltage its real part and its imaginary part are determined for determination of the distance d to be measured.

The method disclosed in the patent to Biermann therefore deals with the distance measurements of two capacitor electrodes. The method in accordance with the present invention however deals with locating of objects enclosed in a medium, wherein a detection signal is generated, which engages in the medium to be investigated. Such a location method is not possible in the patent to Biermann.

As for the Examiner's proposed combination of the references and the Examiner's statement that the present invention can be considered as obvious from such a combination, it is respectfully submitted that it can be considered as obvious to combine the references since the references disclose methods and/or apparatuses which are used for different objectives, perform different functions, and operate in a different manner.

In connection with this, it is believed to be advisable to cite some legal decisions related to the proposed combination of the references.

In the decision in re ASCS Hosp. Sys., Inc. V. Montefiore Hosp., 221 USPQ 929, 932, 933 (Fed. Cir. 1984) it was stated:

"Obviousness cannot be established by combining the teaching of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination"

Definitely, the patents applied by the Examiner do not have any teaching or suggestion supporting the combination and can not have such teaching or suggestion, since they deal with totally different methods which a person of ordinary skill in the art would never combine with one another.

It is also well known that the proposed modification or combination of the prior art should not change the principle operation of the prior art and then should not be modified. If such a change would be required, the teachings of the references are not sufficient to render the claims as obvious. In re Ratti, 270 F. 2d A10, 123 USPQ 349 (CCPA 1959) it was stated that the:

"Suggested combination of references would require a substantial reconstruction and redesign of the elements shown in the primary reference as well as a change in the basic principle under which the primary reference construction was designed to operate"

Therefore the proposed combination of the reference could not be considered as obvious.

It is believed that these decisions are applicable to the Examiner's rejection of the claims over the suggested combination of the references.

The Examiner's attention is also respectfully directed to the features of some dependent claims, in particular claims 2, 7 and 9.

The Examiner's opinion that the patent to Bijawat discloses for the enclosing medium a model for the material of this medium, which has n parameters is wrong. The method disclosed in the patent to Bijawat does not use any mathematical models for the background medium.

The method disclosed in the patent to Bijawat utilizes various sensors 38, 40 and 42 which correspond to different enclosed objects. This is clearly explained in column 3, lines 23-61 cited by the Examiner. The Examiner is respectfully requested to explain where in his citations the features of claim 2 are disclosed. The Examiner's citation defines the following:

Plural sensing elements 38, 40 and 42 are secured within the housing of sensor 10 so as to be in alignment with the sensor's

longitudinal axis for providing information indicative of the type of object hidden behind the applicable building surface and its location. Sensing element 38 is provided for sensing the existence and location of live wires. Sensing in the element 40 is provided to sense the presence of metal objects behind the surface. Sensing element 42 is provided to sense studs behind the applicable structural surface."

Neither this part, nor the whole description of the patent to Bijawat discloses a model for the background material, in particular a model with n parameters. Therefore it is believed that the Examiner's arguments can not be considered as convincing.

With respect to claim 10, it is respectfully submitted that this claim defines that the depth information about the object enclosed in the medium is obtained by using the dielectric constants of the material of the enclosing medium that were determined from a phase measurement of corresponding signal parts of the measuring signal, originated from the object enclosed in the medium. The patent to Bijawat does not disclose either the separation of the signal into the signal parts originating from the enclosed object or from the enclosing medium, or a phase measurement, in particular a phase measurement of such signal parts of the measuring signal which are originated from the object enclosed in the medium. A phase measurement is not provided in the patent to Bijawat.

The apparatus disclosed in the patent to Bijawat further has no displacement sensors, and therefore no functional association of a

measured value to a location value is possible with the apparatus disclosed in this reference, as defined in claim 11 in the present application. In the apparatus disclosed in the patent to Bijawat the measuring signal can not be measured and evaluated as a function of lateral displacement of the sensor device which generates the detection signal. What is claimed is a functional relationship between the location and the measuring signal. Since a location measurement is not possible with the apparatus disclosed in the patent to Bijawat, such a functional relationship is neither measured nor evaluated. Therefore the features of claim 11 can not be considered as disclosed in the patent to Bijawat.

With respect to claim 12, it is again respectfully submitted that the patent to Bijawat discloses the use of a single measuring frequency within the region between 50 and 60 Hz. The Examiner's statement that the patent to Bijawat, and in particular in its part in column 3, lines 62-67, can measure and evaluate the measuring signal as a function of more than one measuring frequency is wrong.

Claim 13 defines a measuring device for carrying out a method according to claim 1. Since as explained herein above, neither the patent to Bijawat nor a combination of this reference with other patents, in particular a combination of this patent with the patent to

Biermann, will not disclose a method as defined now in claim 1, claims 13 should also be considered as patentably distinguishing over the art.

Claim 3 was rejected by the Examiner over the combination of the patents to Bijawat, Biermann and Spörl. The Examiner is respectfully requested to explain why it is obvious to combine these three references with one another. There is no hint or suggestion in the references to combine them with one another, there is no hint or suggestion to combine the references in a specific manner proposed by the Examiner, and there is no hint or suggestion to arrive at specific features defined in claim 3 from such a combination. It is believed that the very combination of the references can not be considered as obvious.

It is absolutely puzzling what relevance the patent to Spörl can have to the features defined in claim 3 in the present application. This reference does not disclose either a characteristic field, or a characteristic field for n parameters of a model for an enclosing medium. The Examiner indicated that the patent to Spörl dealt with a stud sensor; however the Examiner's opinion is wrong. The patent to Spörl deals with a temperature compensation in capacitive distance measurements between a working head and a workpiece. Therefore, it actually discloses a device which is similar to the device of the patent to Biermann. It is completely unclear where the Examiner found a stud sensor in the patent to Spörl and

he is respectfully requested to clarify this issue. It is believed that claim 3 should be considered also as patentably distinguishing over the art and should be allowed.

As for the retained dependent claims, these claims depend on claim 1, they share its presumably allowable features, and therefore it is respectfully submitted that they should be allowed as well.

It is therefore believed that the present application should be considered as allowable and such action is earnestly solicited.

Reconsideration and allowance of the present application is most respectfully requested.

Should the Examiner require or consider it advisable that the specification, claims and/or drawings be further amended or corrected in formal respects in order to place this case in condition for final allowance, then it is respectfully requested that such amendments or corrections be carried out by Examiner's Amendment, and the case be passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing this case to allowance, he is invited to telephone the undersigned (at 631-549-4700).

Respectfully submitted,

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